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Seasonal Variation, Abundance and Condition Factor of Fish Species in Erinle Reservoir

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Abstract

Fish species abundance, seasonal variation and condition factor (k) was assessed in this study between October 2012 and September 2013. Samples collected from Erinle reservoir were identified and sorted out into species, the morphometric parameters of each sample were measured using a measuring board graduated in cm and weighed using a Mettler balance (P 1210 model). Fulton's condition factor (k) was calculated using the equation K=100W/L. Fish species identified were twelve: *Alestes macrolepidotus*, *Chromidotilapia guntheri*, *Oreochromis niloticus*, *Sarotherodon galilaeus*, *Tilapia mariae*, *Tilapia zillii*, *Clarias gariepinus*, *Chrysichthys auratus*, *Hepsetus odoe*, *Mormyrus rume*, *Marcusenius senegalensis* and *Schilbe mystus*. The species belong to seven families from a total of 561 fish samples with varying degree of abundance. *S. galilaeus* had the highest abundance of 55.08% of the total samples collected while *C. gariepinus* had the lowest abundance of 0.18% as only one sample was collected during the study period. Abundance of fish species was higher during the dry season than the raining season with 360 and 201 fish samples respectively. *A. macrolepidotus*, *C. gariepinus* and *M. senegalensis* were not observed during the raining season. Mean condition factor (k) showed the reservoir was favourable for all species except *C. gariepinus*, *C. auratus*, *H. odoe*, *M. rume* and *S. mystus* as their K-value was <1.0. The study concluded that Erinle reservoir can support fisheries provided anthropogenic influence is properly monitored and regulated by relevant authorities.

Keywords: Fish diversity; abundance; condition factor.

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1. Introduction

Tropical reservoirs undergo different seasonal hydrology which is associated with periods of low and high water levels [2], this is consequence of the changes in precipitation pattern within the raining season and dry season. Many environmental factors that affect the abundance and sustenance of available fish species within tropical reservoirs vary with water level. The factors as described by [1] include water temperature, dissolved nutrients, dissolved oxygen concentrations, potency of pollutants and other anthropogenic activities.

The freshwater fish species found in Nigeria are about 268. These species inhabit freshwater bodies such as streams, reservoirs, lakes and rivers which constitute about 12% of Nigeria's total surface area [3]. The fish depends on water for support, food, dissolved oxygen and shelter [4] and the volume and quality of water determines the diversity and abundance of fishes within water bodies. The author in [5] proved that fishes provided the cheapest source of animal protein for the poor Nigerian population, Erinle reservoir being the largest reservoir in Osun State is expected to have high abundance of fish species across seasons to support the nutrition of people living close to the reservoir. This paper provides information on seasonal composition, relative abundance and condition factor of the fish species in Erinle reservoir.

2. Materials and methods

Erinle reservoir is located at Ede, Osun State, the surface area is about 1.25 Km^2 [6]. The location is at longitude 4° 27' E and latitude 7° 46' N (Figure 1).

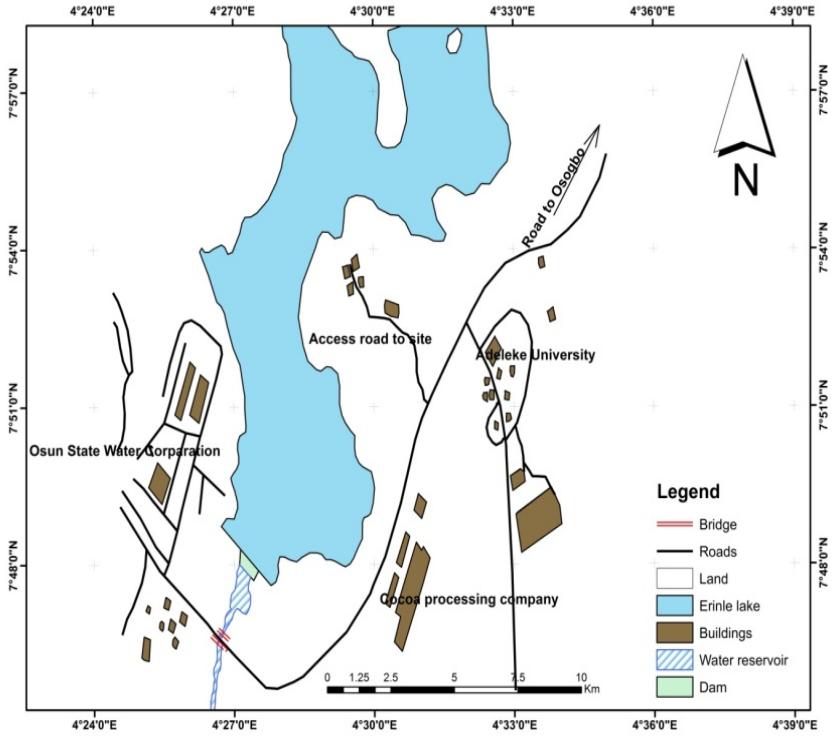

Figure 1: Erinle reservoir and catchment area.

Fish sampling was carried out monthly from October 2012 and extended to September 2013 using gill nets. All fish samples were kept in ice-chest and transported to the laboratory. The fishes were sorted into different species using identification keys prepared by [7]. Samples were weighed using a Mettler balance (P 1210 model), the morphometric parameters were measured using a measuring board graduated in cm. Fulton's condition factor was calculated from the equation; K = 100W/L [8], where W is the weight of fish (g) and L is the total length of fish (cm).

3. Results

The study showed 12 species of fish belonging to seven families. The family *Cichlidae* had 5 species, *Mormyridae* was represented by 2 species while other families had one species each (Table 1). The abundance of fish species as observed in samples collected showed that *S. galilaeus* had the highest abundance with 55.08% followed by *T. zillii* with 14.08% and *C. auratus* with 8.91% while *C. gariepinus* had the lowest abundance with 0.81% (Table 2).

Table 1: Fish Species in Erinle Reservoir.

Fish family	Species	English Name
Alestidae	*Alestes macrolepidotus*(Valenciennes,1850)	African Tetra
Cichlidae	*Chromidotilapia guntheri*(Sauvage,1882)	Guenther's Cichilid
	Oreochromis niloticus (Linnaeus,1758)	Nile Tilapia
	Sarotherodon galilaeus(Linnaeus,1758)	Mango Tilapia
	Tilapia mariae(Boulenger,1899)	Spotted Tilapia
	Tilapia zillii(Gunther,1862)	Red belly Tilapia
Claridae	*Clarias gariepinus*(Burchell,1822)	African Catfish
Claroteidae	*Chrysichthys auratus*(Geoffroy St. Hilaire,1809)	Golden Nile Catfish
Hepsetidae	*Hepsetus odoe*(Bloch,1794)	African Pike
Mormyridae	*Mormyrus rume*(Valenciennes,1847)	Elephant fish
	Marcusenius senegalensis(Steindachner,1870)	Trunk fish
Schilbeidae	*Schilbe mystus*(Linnaeus,1758)	African butter Catfish

The fish caught during the dry season (Oct. 2012-Mar. 2013) was higher than the raining season (Apr.-Sep. 2013) with 360 and 201 samples respectively. Two fish species caught throughout the study period were *S. galilaeus* and *T. zillii*. Three species were not observed during the raining season; *A. macrolepidotus, M. senegalensis* and *C. gariepinus* while others had varying degree of abundance across seasons (Table 2). In June, 2013 no fish was retrieved from the reservoir because of increased water levels due to flooding.

Table 2: Seasonal Variation in Abundance of Fish Species.

Fish Species	2012			2013									Total num. Of fish	Fish abundance (%)
	Dry season						Rainy season							
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep		
Alestes macrolepidotus	2	-	1	-	-	3	-	-	-	-	-	-	6	1.07
Chromidotilapia guntheri	6	5	2	5	-	4	-	-	-	6	-	-	28	4.99
Chrysichthys auratus	25	1	-	-	2	1	11	-	-	9	1	-	50	8.91
Clarias gariepinus	-	-	1	-	-	-	-	-	-	-	-	-	1	0.18
Hepsetus odoe	-	-	-	1	-	-	1	-	-	-	-	-	2	0.36
Marcusenius senegalensis	-	6	2	-	-	1	-	-	-	-	-	-	9	1.60
Mormyrus rume	-	7	2	-	1	15	1	-	-	-	2	2	30	5.35
Oreochromis niloticus	3	7	6	4	1	-	-	-	-	-	1	3	25	4.46
Sarotherodon galilaeus	29	15	6	30	43	62	46	40	-	14	22	2	309	55.08
Schilbe mystus	-	-	4	-	1	-	1	-	-	-	-	-	6	1.07
Tilapia mariae	3	2	1	2	-	1	5	-	-	-	-	2	16	2.85
Tilapia zillii	21	11	1	2	1	11	4	2	-	18	6	2	79	14.08
Total	89	54	26	44	49	98	69	42	0	47	32	11	561	100

The condition factor shows the well-being of the fishes in the reservoir, all the fish species had condition factor (k) > 1.0 except *C. auratus*, *C. gariepinus*, *H. odoe*, *M. rume* and *S. mystus* (Table 3).

Table 3: Condition Factor of Fish Species

Species	TL range(cm)	Mean TL±SD	Weight range(g)	Mean weight ±SD	Condition factor (k) range	Mean (k) ±SD
Alestes macrolepidotus	7.0-21.0	15.25±4.57	10.0-95.0	51.3±29.29	0.98 – 2.91	1.5±0.730
Chromidotilapia guntheri	8.6-17.6	12.95±2.18	11.0-100.0	40.8±21.83	1.05 – 2.16	1.7±0.223
Chrysichthys auratus	11.5-22.5	16.21±2.56	10.0-94.8	40.7±21.36	0.34 – 1.28	0.9±0.212
Clarias gariepinus	29.0-29.0	29.00±0.00	157.0-157.0	157.0±0.00	0.64 – 0.64	0.6±0.000
Hepsetus odoe	19.2-19.6	19.4±0.28	45.0-48.6	46.8±2.55	0.59 – 0.68	0.6±0.629
Marcusenius senegalensis	13.5-20.6	17.63±2.15	32.0-85.7	59.0±16.49	0.71 – 1.35	1.1±0.189
Mormyrus rume	20.5-40.2	26.6±5.21	50.0-380.0	130.2±83.20	0.45 – 0.79	0.6±0.075
Oreochromis niloticus	12.0-25.8	17.16±4.04	29.2-248.0	100.8±69.50	1.26 – 2.37	1.7±0.223
Sarotherodon galilaeus	7.5-27.0	15.37±2.59	8.0-325.0	72.2±40.41	0.90 – 2.93	1.8±0.247
Schilbe mystus	17.5-24.0	20.75±2.77	41.0-100.0	66.1±25.28	0.66 –0.85	0.7±0.069
Tilapia mariae	10.2-15.5	13.18±1.37	20.2-81.7	48.8±15.82	1.64 – 2.35	2.1±0.211
Tilapia zillii	9.0-17.0	12.66±1.87	17.0-76.2	40.8±14.17	1.38 – 3.29	1.9±0.382

4. Discussion

Fish diversity and abundance showed variation within and across seasons during the period of study as also reported by [9,10,11] in lower River Niger. Two peaks were observed in fishing output in October and March which were the beginning of the dry and raining seasons respectively, this probably suggest that fish species are readily available for catch during periods connecting seasons due to changes in temperature and precipitation. The abundance of fish species in catch showed higher proportion in the dry season (64.2%) as against the 35.8% observed in the raining season, similar observation was made by [12] at Kontangora reservoir. *S. galilaeus* had the highest level of abundance with over 50% of fish catch, other species within the family Cichlidae also showed relative abundance as observed by [13] at Asejire reservoir.

Seven out of the twelve species caught in Erinle reservoir is on the IUCN red list of threatened species based on the level of exploitation and reduction across their range. These species are found in Africa and the names are; *S. mystus, A. macrolepidotus, C. auratus, H. odoe, T. mariae, C. guntheri* and *M. rume*. Other species identified in this study with relative abundance across their range in Africa were not listed on the IUCN red list. These included *C. gariepinus, M. senegalensis, T. zillii, S. galilaeus* and *O. niloticus*.

The health of fish species due to the nutritional condition within Erinle reservoir during the period of study was assessed with Fulton's condition factor [8], seven species had their mean condition factor (k) above 1.0 while the other five species had their k-value between 0.1 and 1.0. Condition factor (k) value should be 1 in a stable undisturbed water body which is impossible in a natural ecosystem, k-value less than or greater than 1 indicates below and average conditions respectively. The k-value of *C. auratus, H. odoe, S. mystus, C. gariepinus* and *M. rume* were lower than 1.0 as also reported at Dadin Kowa Dam by [3].

5. Conclusion

The reservoir can support fisheries and increase abundance of fish species if proper management procedures are ensured by responsible agencies of government because most of the observed fish species had relatively good condition factor (k) value. Human activities on and around the reservoir might have some level of influence on the variations observed but this paper did not assess that in relation to seasonal variation , abundance and condition factor of the observed fish species. It is therefore recommended that long term studies on anthropogenic influence on Erinle and other tropical reservoirs be conducted to relate human influence with sustenance of fisheries.

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